ANALYSIS OF RISK FACTORS PREDICTING SURGERY IN CASES WITH TUBO-OVARIAN ABSCESS

TUBOOVARYEN APSE OLGULARINDA CERRAHİYİ ÖNGÖREN RİSK FAKTÖRLERİNİN ANALİZİ

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Öz

Amaç: Tuboovaryan apse (TOA) tanısı koyulmuş olgularda medikal tedavinin başarı oranının değerlendirilmesi ve cerrahi tedavi gereksinimini öngören risk faktörlerini belirlenmesi amaçlanmıştır. Gereç ve Yöntem: Bu vaka kontrol çalışmasına 3. basamak bir hastanede TOA tanısı koyulmuş olan 62 olgu dahil edildi. Sadece medikal tedavi alan hastalar (Grup 1, n=53) ve medikal tedavi alırken cerrahi uygulanan hastalar (Grup 2, n=9) olmak üzere 2 grup oluşturuldu. Cerrahi tedavi gereksinimini öngören risk faktörlerini belirlemek için multiple logistic regression analizi uygulandı. Bulgular: Medikal tedavinin başarı oranı %85,5 olarak belirlendi. Başvuru anındaki şu risk faktörleri cerrahi tedavi gereksinimi ile istatiki olarak anlamlı şekilde ilişkili saptandı: ateş varlığı (>38.0˚C) (OR:2.9; 95% CI 1.6-5.2; p=0.001), beyaz küre sayımı ≥ 18.000 hücre/mm³ (OR: 20.1; 95% CI 3.4-66.5; p=0.000), apse çapı ≥ 7 cm (OR:9.4; 95% CI 5.1-17.3; p=0.001) ve CRP seviyesi ≥ 70 mg/dL (OR: 3.8; 95% CI 2.2-9.8; p=0.003). Tartışma: Mevcut çalışmada, TOA olgularında medikal tedavinin başarı oranı oldukça yüksek saptandı. Dolayısıyla, akut karın bulgusu olan olgular dışında, TOA olgularında medikal tedavi ilk seçenek olarak tercih edilebilir. Başvuru anındaki beyaz küre sayımı ve apse çapı yüksek olgularda cerrahi tedavi ilk seçenek olabilir çünkü bunlar cerrahi gereksinimi ile ilişkilendiren başlıca faktörler olarak bulunmuştur.

Anahtar Kelimeler

Medikal Tedavi; Risk Analizi; Başarı Oranı; Cerrahi; Tuboovaryan Apse

Abstract

Aim: This study aimed to evaluate the success rate of medical treatment and to determine the risk factors predicting the need for surgery in cases diagnosed with tubo-ovarian abscess (TOA). Material and Method: A total of 62 patients diagnosed with TOA at a tertiary referral hospital were involved in this case-control study. Two groups were formed: Patients who received medical treatment only (Group 1, n=53) and those who underwent surgery while receiving medical treatment (Group 2, n=9). Multiple logistic regression analysis was performed to determine the risk factors predicting the need for surgical treatment. Results: The success rate of the medical treatment without surgery was determined as 85.5%. The following risk factors on admission were found to be statistically significantly associated with a need for surgical treatment: presence of fever (>38.0˚C) (OR:2.9; 95% CI 1.6-5.2; p=0.001), WBC count ≥ 18.000 cells/mm³ (OR: 20.1; 95% CI 3.4-66.5; p=0.000), abscess diameter ≥ 7 cm (OR:9.4; 95% CI 5.1-17.3; p=0.001), and CRP level ≥ 70 mg/dL (OR: 3.8; 95% CI 2.2-9.8; p=0.003). Discussion: In the present study, the success of medical treatment in cases with TOA was found to be fairly high. Therefore, except in cases of acute abdomen findings, medical treatment without surgery can be preferred as the initial treatment choice in TOA. In TOA cases with high WBC count and high abscess diameter on admission, surgical treatment can be the preferred first choice as these were found to be the major risk factors associated with the requirement for surgery.

Keywords

Medical Treatment; Risk Analysis; Success Rate; Surgery; Tubo-Ovarian Abscess

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Introduction

Tubo-ovarian abscess (TOA) is one of the most serious complications of pelvic inflammatory disease (PID), with a reported prevalence of 10-30% among patients hospitalized for PID [1, 2]. PID is classified as acute, subacute, or subclinical. The actual prevalence of PID is generally underestimated because of the difficulty in diagnosing subclinical infections [3].

PID is highly associated with the onset of sexual intercourse at a younger age, multiple sexual partners, non-use of barrier contraception, and infection with chlamydia or gonorrhea [4]. The risk factors for TOA are similar to those of PID. In addition, a prior history of PID is one of the most important risk factors for TOA [5].

Due to variations in clinical features and lack of specific laboratory tests, appropriate medical therapy is often delayed. As a result, almost one in four women with pelvic inflammatory disease experience long-term complications such as chronic abdominal pain, ectopic pregnancy, and infertility [6].

PID and TOA are polymicrobial infections of anaerobic and aerobic bacteria. While Neisseria gonorrhoeae and chlamydia trachomatis are thought to facilitate the infection, they are rarely recovered from an abscess [7, 8]. The most commonly isolated organisms from TOA are the Escherichia coli and Bacteroides species [9].

The optimal approach to the management of TOA remains controversial. Although the majority of TOA cases respond to antibiotic therapy, in approximately 25% of cases, surgery or drainage is indicated. Previously, treatment for tubo-ovarian abscess consisted of medical therapy and laparotomy, usually involving unilateral or bilateral salpingo-ophorectomy, hysterectomy, and in some cases, colpotomy. Although removal of affected organs offered high cure rates, the procedure was associated with significant morbidity, infertility, and early menopause. To avoid such adverse effects, a more organ-preserving approach was required [8].

For the medical therapy of TOA, empirical broad-spectrum antibiotics have been recommended by the Centers for Disease Control and Prevention (CDC) [10]. However, in some cases resistant to antibiotic therapy, surgery may be needed.

Very few recent studies in the literature have evaluated treatment modalities in TOA, and these have mostly been published as case reports. Therefore, the current study will cast new light on treatment of cases with TOA.

In this study, it was aimed to determine the success rate of medical treatment and to identify clinical, laboratory, and sonographic predictors for surgical intervention requirement in patients receiving medical treatment for TOA.

Material and Method

This retrospective case-control study included a total of 69 patients diagnosed with tubo-ovarian abscess between January 2009 and May 2015 at Kahramanmaras Sütcü Imam University Hospital, Department of Obstetrics and Gynecology. Approval for the study was granted by the Institutional Ethics Committees.

Upon patient admission, an assessment was made of demographic characteristics, and laboratory and sonographic parameters, including age, gravida, parity, cigarette use, previous pelvic surgery, history of previous PID, intrauterine device (IUD) usage, duration of hospitalization, abscess diameter (cm), body temperature (°C), white blood cell (WBC) count, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP).

The diagnosis of PID was made by the presence of at least two major criteria (lower abdominal quadrant tenderness, cervical motion tenderness, adnexial tenderness), and at least one minor criterion (body temperature > 38.0 °C, cervicovaginal mucopurulent discharge, WBC >10000/ml, ESR >15 mm/ hour, or CRP >10 mg/L) [11]. The presence of the diagnostic criteria of PID together with an abscess on ultrasonographic and/or computed tomography/magnetic resonance imaging was used to establish the diagnosis of TOA. Typically, TOA appears as a complex thick-walled multiloculated cystic mass which may contain solid areas [9].

Cases diagnosed with TOA were hospitalized and broad-spectrum antibiotic treatment, as recommended in CDC treatment guidelines for PID, was administered parenterally [10]. Because the penetration of antibiotics into the abscess tissue may be slow, a period of 96 hours was waited to evaluate the clinical response to the medical treatment. If clinical and laboratory recovery was observed within 96 hours of medical treatment, the patient was discharged with doxycycline 100 mgr q12h for 14 days.

Surgical treatment was applied to patients without prominent recovery after 96 hours of medical treatment and to those with worsening clinical or laboratory signs while receiving medical treatment. Patients requiring surgical intervention due to acute abdomen within the first 48 hours following admission were excluded from the study

Transvaginal drainage, unilateral salpingo-oopherectomy, or total abdominal hysterectomy and bilateral salpingo-oophorectomy were optional surgical procedures.

During the study period, a total of 69 patients were diagnosed with TOA and were admitted to hospital. Four patients who had acute abdomen with TOA located in the Douglas pouch underwent emergency transvaginal drainage before medical therapy and were excluded from the study. Three patients with malignancy were also excluded, leaving 62 patients who were categorized into two groups:

Group 1 (n=53): Patients with recovery achieved by medical treatment alone.

Group 2 (n=9): Patients who required surgical intervention while receiving medical treatment.

Statistical analyses were performed using the Statistical Package for Social Sciences version 18.0 software (SPSS IBM Software, Armonk, NY, USA). The normality of the distribution of continuous variables was assessed with the Kolmogorov–Smirnov test. The x2 test was used to analyze categorical variables, the Anova test was used for normally distributed variables, and the the Mann–Whitney U test was used for variables not having a normal distribution. Odds ratios (ORs) for the independent risk factors that predict the need for surgical treatment at a 95% confidence interval were determined using a multivariable logistic regression model. A value of $p< 0.05$ was considered to indicate statistical significance.

Results

The success rate of the medical treatment without surgery was 85.5% (53/62).

Group 1 and Group 2 were similiar in terms of average age, cigarette smoking, history of previous surgery, and length of hospital stay. The mean gravida and parity were significantly higher in Group 2. A previous history of PID was recorded in 37.7% of Group 1 patients and in 77.7% of Group 2 (p= 0.002). The IUD usage of of Group 1 and Group 2 was determined as 71.6% and 100%, respectively (p=0.01). The mean abscess diameter on admission was determined to be statistically significantly higher in Group 2 than in Group 1 (p < 0.001). The frequency of patients with fever was found to be higher in Group 2. Patients in Group 2 were found to have significantly higher mean WBC count, higher mean CRP level, and higher mean ESR rate (Table 1).

Table 2 shows the results of conducting a multivariable logistic regression model to control for all of the statistically significant factors in univariate analysis, with the 'need for surgical intervention' as the outcome variable. The mean values of the continuous variables in Table 1 were utilized to make a stratification for logistic regression analysis.

The following factors were found to be significantly associated with the need for surgery: WBC levels 18000 cells/mm³ (OR: 20.1; 95% CI 3.4-66.5; p=0.000), abscess size 7 cm (OR:9.4; 95% CI 5.1-17.3; p=0.001), CRP ≥ 70 mg/dL (OR: 3.8; 95% CI 2.2-9.8; p=0.003), and fever ≥ 38.0 (°C) (OR:2.9; 95% CI 1.6-5.2; p=0.001) (Table 2).

Table 1. Demographic and clinical characteristics of patients

	Medical treatment (Group 1, n= 53)	Surgical treatment (Group 2, n= 9)	p value
Age	34.5±8.7	38.1±5.6	0.092‡,
Mean ± SD			
Gravida	2.9±1.8	3.6±1.1	0.035*‡
Mean ± SD			
Parity	2.6±1.5	3.6±1.1	0.002*‡
Mean ± SD			
Cigarette use†	47.2%	55.5%	0.510§
Previous pelvic surgery†	24.5%	44.4%	0.080§
History of previous PID†	37.7%	77.7%	0.002*§
IUD usage†	71.6%	100%	0.006*§
Duration of hospitalization (day)	9.3±2.7	10.4±2.6	0.128‡
Mean ± SD			
Abscess diameter (cm)	4.9±0.9	7.5±1.1	<0.001*‡
Mean ± SD			
Presence of fever (>38.0°C)†	29.6%	65.8%	<0.001*§
WBC (cells/mm³)	10750±3340	19280±2480	<0.001*‡
Mean ± SD			
CRP (mg/dL)	49.5±30.3	72±21.5	<0.001*‡
Mean ± SD			
ESR (mm/h)	57.2±21.6	80.7±10.8	<0.001*‡
Mean ± SD			

*Statistically significant; † Values are in percentage; ‡Mann-Whitney U-Test; §x2 test; SD, standard deviation; WBC, White blood cell; CRP, C-Reactive protein; ESR, Erythrocyte sedimentation rate; PID, pelvic inflammatory disease; IUD, Intrauterine device.

Table 2. Risk factors on admission associated with a need for surgical treatment

	Group 1 (n=53) †	Group 2 (n=9) †	Odds Ratio (95% CI)	P value
Gravida ≥3	75.5	100	-	0.446
Parity ≥3	72.0	88.9	-	0.814
History of previous PID	37.7	77.7	-	0.242
IUD usage	71.6	100	-	0.973
Abscess diameter≥ 7 cm	11.7	78.9	11.7 (2.3-59.6)	0.001*
WBC count≥ 18.000 (cells/mm³)	18.2	100	20.1 (3.4-66.5)	0.000*
CRP ≥ 70 (mg/dL)	12.3	78.4	3.8 (2.2-9.8)	0.003*
Fever ≥ 38.0 (°C)	29.6	65.8	2.9 (1.6-5.2)	0.001*
ESR ≥ 80 mm/h	60.1	88.9	-	0.675

† Values stated as percentage; *Statistically significant; PID, pelvic inflammatory disease; IUD, Intrauterine device; WBC, White blood cell; CRP, C-Reactive protein; ESR; Erythrocyte sedimentation rate CI, Confidence interval.

Discussion

Broad-spectrum antibiotic therapy for TOA has been reported at a wide range of success rates from 34% to 87.5% [2]. Approximately 75% of patients respond to antibiotics, while 25% require surgical intervention due to some resistance [9]. No particular first-line antibiotic treatment regimen has been found to be superior to any other [3].

In the current study, the success rate of the medical treatments without surgery was 85.5%. This fairly high cure rate can support the continuation of medical treatment unless signs or symptoms indicate the necessity for emergency surgery. However, one of the major limitations of the current study is the lack of comparison of patients receiving medical treatment or undergoing surgery with respect to long-term complications such as chronic pelvic pain and infertility. It was reported in a review that the fertility rate varied between 32%-63% if laparoscopic drainage was applied within the first 24 hours followed by medical treatment, compared to 4%-15% if medical treatment alone was applied [11].

In many studies, the need for surgery has been mostly associated with abscess size [11-15]. For example, in a previous study by Reed et al. [12], 35% of patients with an abscess 7-9 cm in size underwent surgery, as did 60% of those with an abscess ≥10 cm.

In another study, abscess size of ≤ 8cm and > 8 cm had surgery rates of 23% and 35%, respectively [13]. In the current study, surgery was necessary for 83.3% (OR:9.4; 95% CI 5.1-17.3; p=0.001) of patients with an abscess size of ≥ 7cm. (Table 2). Therefore, this shows that an abscess size of ≥ 7cm increases the risk of requirement for surgical intervention.

Mizushima et al. [14] found that the size of the abscess alone increased the probability of surgery. Abscess size of > 5 cm was seen to result in a 69-fold increased risk of surgery. In the same study, no significant difference was determined between medical and surgical therapy groups in terms of age, gravida, parity, body temperature, leukocyte levels, or CRP levels.

In the current study, using univariate analysis, significant differences were determined in the comparison of Group 1 and Group 2 in terms of WBC, CRP, and ESR, gravida, parity, history of previous PID, IUD usage, and abscess size (Table 1). However, in

the multivariate logistic regression model, of these parameters, only high WBC count, presence of fever, abscess size, and high CRP were found to be risk factors for surgical intervention.

In a retrospective study by Güngördük et al. [15], in 25.7% of cases, surgery was undertaken due to failure of medical treatment. In the same study, while there was a statistically significant difference between patients who were treated medically or surgically with respect to CRP levels, ESR, and abscess diameter ≥ 7 cm, no logistic regression analysis was performed to determine independent risk factors for surgery [15].

In a retrospective study of 135 TOA cases, Dewitt et al. [13] stated that an abscess size > 8 cm was associated with increased complication rates and prolonged hospitalization. However, in that study the p value regarding the hospital stay was 0.09, which was not statistically significant. In contrast to the current study's findings, high abscess size (> 8 cm) was not found to be associated with an increased rate of surgical treatment [13].

In the current study, body temperature, WBC and CRP levels were found to be associated with the requirement for surgery. Of these, the mean WBC level was a highly significant predictor. Surgery was applied to 61.5% of the patients with ≥ 15000 cells/mm³ initial leukocyte level (OR:9.4; 95% CI 5.1-17.3) and to 100% of those with ≥18000 (OR:20.1; 95% CI 3.4-66.5). According to these results, the most important factors in the risk of surgery for the patient were WBC level and abscess size. Leukocyte levels ≥ 18000 cells/mm³ and abscess size ≥ 7 cm can be recommended as the cut-off values in the decision for surgery. A WBC level of ≥ 18000 alone can also be a highly significant predictor for surgery (Table 1, 2).

In conclusion, in the current study, the success of medical treatment alone in TOA was found to be relatively high. Except in cases with acute abdomen, medical treatment can be preferred as the initial treatment choice for cases diagnosed with TOA. However, a lack of comparison of patients receiving medical treatment or undergoing surgery with respect to long-term complications such as chronic pelvic pain and infertility was a major limiting factor in the current study. In TOA cases with high WBC count and high abscess diameter on admission, surgical treatment may be selected as the first choice. If medical treatment alone is the initial treatment option, strict surveillance may be prudent, since high WBC count and high abscess diameter were found to be the major risk factors associated with the requirement for surgery.

Competing interests

The authors declare that they have no competing interests.

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